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we, on the other hand, are acquainted with the finer structure of the organs of hearing in the Orthoptera, and know that they have no such constituted brain-centres as the olfactory lobes.

Thirdly, Flögel draws attention to the wonderful and so little understood facts that in insects, where the lobes ("bechers" of Flögel, "lappen," "gestielte körper," etc., of Dietl) and the substance around it (gerüst) constitute the greater part of the brain, there is indeed no connection of the nerve-fibres to be found with the remaining parts of the brain, and consequently also with the œsophageal commissures. The opinion that the ganglionic cells are in direct relation through fibres with the organs of the body is provisionally unfortunately contradicted. But where are the intermediate stations? he asks.

Finally, the author claims that the essay indicates the outlines of a future brain-topography for insects, and shows that the single parts of the brain have their homologues in the different orders of insects; consequently a ground-plan in the organization is not to be mistaken, and thus a comparative anatomy of the brain of insects is outlined comparable with that of the vertebrates, as established by the researches of Stieda.

BARROIS' EMBRYOLOGY OF BRYOZOA.[1]—The author of this elaborate and beautifully illustrated memoir is well-known for his able and thorough work on the development of the sponges and nemertean worms. A large number of typical forms of Polyzoa or Bryozoa, as the German and French call them, have been studied, and the different stages figured, including the genera Loxosoma, Pedicellina, and several genera of higher marine forms. We will give the general results of our author's work condensed from the *résumé général*. A study of the different groups of Chilostomatous and Cyclostomatous Polyzoa, shows that their development presents the same phenomena, characterized by the great regularity of the segmentation (*morula*) and giving rise to a *blastula*, in which the advanced morula is composed of two distinct halves (oral and aboral) separated by a crown of cilia. Then the *gastrula* state is assumed and afterwards the mesoderm arises. At the moment of birth, the embryo always withdraws the aboral end within the crown and thus assumes a discoidal aspect, but it can undergo this process much more rapidly, previous to the appearance of the fur-

FIG. 1. FIG. 2.

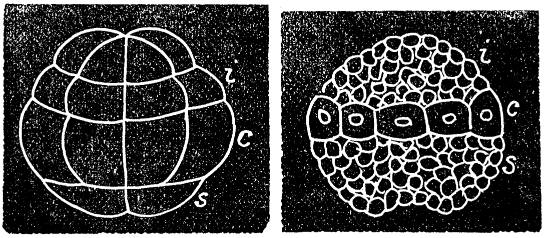

FIG. 1.—Blastula of *Alcyonidium mytili*. FIG. 2.—Gastrula of the same; *c*, beginning of crown.

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[1] *Recherches sur l'Embryologie des Bryozoaires.* Par J. BARROIS. Lille, 1877. °, pp. 305, with 16 plates.

row, so that we are led to distinguish in certain types, the presence a little after the gastrula stage of a stage with an aboral mass and extended or widened face separated one from the other by the furrow (Fig. 3, *sb*). Hence he distinguishes two fundamental forms; that which presents in the embryos the division into an aboral and extended face (Alcyonidian or pedunculate form), and that in which the furrow is wanting, constituting the Escharine or sessile form. Barrois considers that the latter is the original form, and that the Alcyonidian form (Fig. 4[1]) is derived from it.

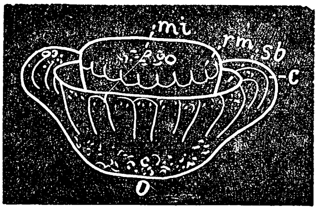

FIG. 3.—Larva of *A. mytili.*

The formation of the recurved intestine of the Polyzoa results from a closure of the opening of the digestive cavity, analogous to the closure of the blastoderm in Clepsine and in Euaxes. The Ectoprocts pass during the period of their development through an Entoproctous condition in which the part which represents the intratentacular space or basilar plate, which separates the digestive cavity from the cavity of the sheath, contains the two openings of the digestive tube, and is completely encircled by the tentacles.

Barrois thinks, contrary to Allman, that it is much more natural to consider the Ectoprocta as organisms throughout comparable to Entoprocta, but in which the anus curves within the tentacular crown, as he had shown to be the case at the time when the tentacles bud out; and it is very improbable that the transitory state in which the crown is interrupted on the anal side is the point of departure of the formation of the lophopore; we shall thus have a general phylogeny of the class of Polyzoa, based on the evolution of the tentacular crown, and disposed as follows: Entoproctes—Lophopodes—Gymnolemes.

He considers that all the different larval forms of Polyzoa may be reduced to a single type composed of a gastrula with two opposite faces or ends separated by the crown, one (aboral) bearing in its centre the buccal opening, and capable of being covered so as to form the vestibule; all the larvæ possess a median muscular or fatty layer (*mi*), which is generally composed of a portion formed by the oral face (labial mesoderm) and of a portion dependent from the aboral face; this last is more constant, more voluminous, and constitutes the essential portion of the mesoderm; it is derived in most cases from a simple delamination of the exoderm, but in the Entoproctes, the intestine appears also to take part in its formation; it is even possible in Pedicellina that it is derived from a fold at the end of the intestine, and that we may find in the Polyzoa some traces of an enterocœle.

From this primitive type, already very complex, the larvæ of the Entoproctes are derived by a differentiation of the mesodermic masses, which place themselves in relation with the skin at three different points to form the three tactile organs. The larvæ of the Cyclostomes are formed by an extension of the crown in the form of a mouth on the aboral face, and finally the larvæ of the Chilostomes (Fig. 4) and Ctenostomes arise by a division of the aboral face into two parts, the cupping glass-like part (*ventouse*) and lower part, resulting from the withdrawal of this same face.

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[1] In all the figures *o* indicates the mouth; *sb* and *si*, the furrow; *c*, the crown of cilia, *mi*, aboral mesoderm; *c*, ciliated crown; *est*, stomach.

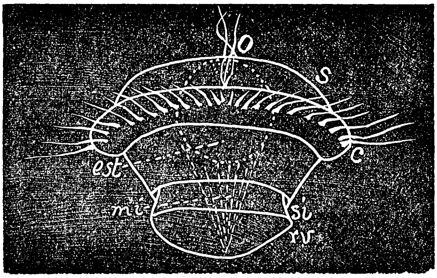

FIG. 4.—Third derived form of Chilostome larva.

Our author then compares the larval form of Polyzoa with those of the Rotifera, and compares their ciliary crown with the rotary organ of Rotifers, the thoracic segment of Brachiopod larvæ and the ciliated crown of the Trochosphere of molluscs and worms, and find a strong similarity between them. He accepts the Trochosphere-forms of Rotifers, Polyzoa, Brachiopodes, Molluscs and Annelids, and thinks that there are essentially two forms, the first giving rise to the Polyzoa, the second to the Brachiopods, Molluscs and Annelids; the first group having the ciliary crown placed below the mouth, and the second and last having the crown of cilia placed above the mouth. He is of the opinion that the Polyzoa on embryological grounds are, on the whole, closely related to the Brachiopods and Rotifers, and from the general resemblance of the larvæ of the entoproctous Polyzoa to the Rotifers he concludes

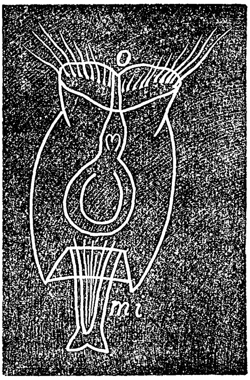

FIG. 5.—A Rotifer.

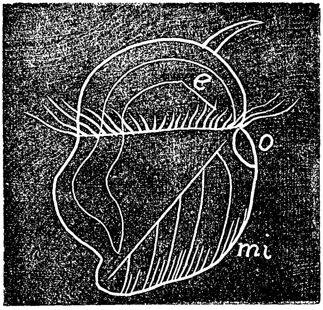

FIG. 6.—Annelid larva.

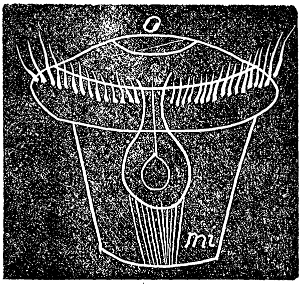

FIG. 7.—Polyzoan larva.

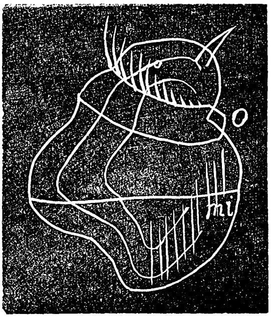

FIG. 8.—Branchiopod larva.

that they have the most intimate relation with the latter. After swimming about as ciliated larvæ, the shell or ectocyst develops and the larva becoming stationary, soon assumes the mature Polyzoan condition.

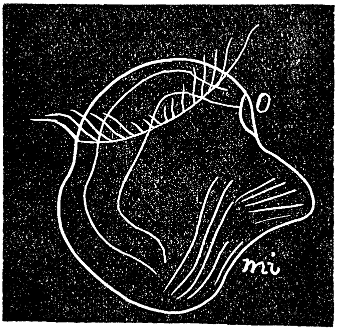

FIG. 9.—Molluscan larva.

The description of the metamorphosis and mode of budding of the polypite in the different forms is fully detailed and illustrated by beautiful figures. As seen in *Phalangella flabellans* (Cyclostomes) the larva, after becoming fixed to some object, consists of a white pyriform mass, closely enveloped by an ectocyst, with numerous fat globules between the latter and the white mass. The ectocyst swells into a discoidal sac, with endocyst, ectocyst, and an external anhistic zone, while the internal whitish mass transforms into the polypide. The discoidal sac formed by the endocyst constitutes simply the basal disc of the primitive cell. The future opening of the cell appears on the upper surface of the cell. The budding out of the secondary cells of the polyzoarium is then described. It begins by the appearance of a cell placed in front and below the primitive cell, and which borders it on each side; its secondary cell then divides into two, each of which gives successively origin to three cells, and we thus arrive at an Idmonea stage, and finally the Phalangella stage is reached, the process being a dichotomous mode of budding quite analogous to that which produces the cormus, spread out in plates, of Escharina.

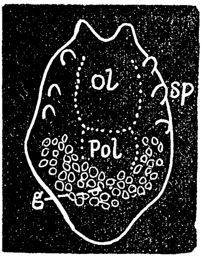

FIG. 10.—*Porella lævis*, primitive cell almost complete. *Pol*, polypide; *g*, fat cells. *sp*. rudimentary spines; *ol*, opening of the cell.

The development of *Membranipora pilosa* is given with much detail. The larva of this species is provided with a bivalve shell, so that it was by Semper and Claparède considered as a Lamellibranchiate larva, but was proved to be a young Polyzoan by Schneider, in 1869. Barrois finds it impossible to compare the shell of this larva to that of the Lamellibranchiates, and considers its metamorphosis as like that of other Chilostomes.

The work must be considered as the most important general treatise on the development of Polyzoa in existence, that of Nitsche being less complete, though of a high order of excellence.

FRAZER'S REPORTS OF PROGRESS IN THE DISTRICT OF YORK, ADAMS, CUMBERLAND AND FRANKLIN COUNTIES, PENNSYLVANIA.[1]—Reports C of the Second Geological Survey of Pennsylvania, and

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[1] *Second Geological Survey of Pennsylvania.* Published by the Board of Commissioners. J. B. Pearce, Secretary; J. P. Lesley, State Geologist. 1876.